Mean distance between adjacent occupied sites for great horned owls was 4.06 km (range 1.42-8.01 km) (Table 4). This was similar to that reported by Knight et al. (1982) for great horned owls in Washington, where the mean distance between pairs was 3.9 km (range 0.8-10.3 km).

Northern Saw-whet Owls

Northern saw-whet owls responded to tape recordings of owl songs (both saw-whet and great horned) on 4 occasions. Based on these responses we assumed that there were 4 saw-whet owl breeding territories (Appendix K). No nests were located.

Saw-whet owls are secondary cavity nesters and use low-elevation deciduous woodlands to high elevation coniferous forests (Reynolds et al. 1989). This owl species was found in both aspen and Douglas-fir woodlands in the BRSA (Table 3).

Mean distance between adjacent occupied sites was 3.42 km (range 0.66-8.83 km) (Table 4) and density of saw-whets was 0.11 singing owls/river km. Swengel and Swengel (1987) reported a population density of 5.0 singing saw-whets/km^2 in Wisconsin, a density far higher than in the BRSA. Their study area was in a mixed hardwood-coniferous forest that provided continuous woodland habitat, unlike that in the BRSA where the habitat was patchy. Swengel and Swengel (1987) also used tape-recorded calls for their census; however, their stops were spaced 100 m apart, whereas our stops were spaced 400 m or 800 m apart. With stops placed so close together in Wisconsin, they could have been hearing some of the same owls. Hayward (1983) conducted forest owl surveys in coniferous forests in central Idaho and he recommended stops every 400-800 m for adequate coverage.

In Wisconsin saw-whet owl detectiblility was highest in March and dropped considerably in April (Swengel and Swengel 1987). In southwestern Idaho and southern British Columbia, saw-whets begin nesting in March (USDI 1988, Cannings 1987). This suggests that in the BRSA we should have conducted the owl surveys earlier in the season to have greatest detectibility.

In order to survey the entire study area before the end of May, we surveyed past midnight on many nights. Some owls might not have responded in late evening/early morning hours because the most vocal period is often 2-3 hours after sunset (see Groves 1988).

Other Raptors, Turkey Vultures, and Ravens

No nests were found of the species discussed in this section because relatively little time was spent trying to locate their nests. Paired American kestrels were observed regularly in 6 locations (Table 1, Figure 3). Kestrels were rarely observed along the upstream half of the study area and no paired birds were seen there. Most agricultural lands occurred in the downstream half of the study area, where kestrel pairs were located. This suggests that kestrels were associated with agriculture in the BRSA.

Swainson's hawks were seen occasionally throughout the study area but were more often observed in the agricultural lands to the north. Only 1 pair of Swainson's hawks was observed courting in the study area near Miner Creek (Figure 3). In this same area, a single adult was seen on several occasions perched near the edge of an aspen patch.

Common ravens seemed fairly common, although only 3 known pairs occupied sites and 2 of those were known to breed. Turkey vultures were very common throughout the study area and pairs of birds were observed in 6 locations (Figure 3). Locating turkey vulture nests often proves difficult because they are not audibly defensive at nest sites as many raptors. They are versatile in the types of sites chosen for nesting, using ledges and caves in cliffs, hollow logs, tree stumps, brushy thickets, and rocky terrain (see Ehrlich et al. 1988).

In early April groups of more than 8 vultures were seen regularly and a roost was found in Douglas-firs near Deer Creek. Vultures were probably taking advantage of winter-killed mule deer, an abundant food source in the Blackfoot River area. The hunting unit within this area had a 2-deer limit, indicating that the mule deer population was abundant and doing well.

Northern harriers were uncommon in the study area but seen more often in the agricultural lands to the north. We expected to find nesting harriers in meadows and brushy areas although none were found. Single birds (both male and female) were seen regularly over the pastureland south of Cedar Creek but courtship behavior was never observed.

No western screech-owls or long-eared owls were seen or heard during this study, although we expected to encounter them. Screech-owls have never been sighted in the study area and possibly the elevation is too high, creating a climate unsuitable for them. A single long-eared owl was observed in the riparian near Trail Creek bridge in 1988 (Frank Renn, pers. commun.). Additional evidence of long-eared owls in the study area was indicated by vocal responses of great horned owls to the tape recorded songs of long-eared owls.

Long-eared owls primarily nest in abandoned corvid nests. We searched riparian areas for old corvid nests hoping to find nesting long-eared owls but in the BRSA magpies and crows rarely built nests in riparian vegetation. Magpies built nests in primarily junipers and crows used junipers, conifers, and aspens. This made it more difficult to find long-eared owls because, unlike the SRBPA, corvid nests were not concentrated in the deciduous trees along the river.

Other Birds

A wide variety of songbirds were found in the study area (see Appendix A). Bird species richness was greatest in aspen communities (33 species), with fewer birds found using sagebrush (29 species), riparian (28 species), juniper (24 species), Douglas-fir (20 species), and agriculture (19 species).

Studies of montane birds have demonstrated that aspen forests are rich in both density and diversity of birds (see Winternitz 1980). Many montane breeding birds have shown a preference for aspen vegetation over conifers. Winternitz (1980) found that several properties of aspen forests were related to breeding bird diversity (numbers and richness); these included abundance of insects, ground moisture levels, nesthole availability, and foliage height diversity. These were probably some of the factors responsible for attracting birds to aspen communities in the BRSA.

MANAGEMENT IMPLICATIONS

The Pocatello Resource Management Plan (RMP) and Environmental Impact Statement analyzed some existing and potential impacts of various activities on wildlife habitat along the Blackfoot River (USDI 1987). Analysis of impacts primarily addressed riparian issues. The RMP did not recognize the Blackfoot River as an important resource for raptors. However, in 1989 Olendorff et al. recognized the BLM land along the Blackfoot River as a "key raptor area".

Primary threats to raptors and their habitat in the Blackfoot River area include hydroelectric development of the river, livestock grazing, agricultural development, utility lines, mining, and recreation. Olendorff et al. (1989) reviewed various land-use actions and their effects (both beneficial and detrimental) on raptors and raptor habitats. According to their evaluation, in the Blackfoot River area all potential land uses except utility lines and some types of recreation would adversely modify habitat and diminish biological diversity. These types of land use actions commonly preclude reproduction or traditional use of habitat for long periods of time or permanently (Olendorff et al. 1989).

Raptors are sensitive indicators of habitat conditions and are usually among the first group of birds to decline when habitats are lost or degraded (Hickey 1969). That is why monitoring is important to determine population trends, habitat trends, actions stated in management plans, and effectiveness of mitigation measures (Olendorff et al. 1989). Monitoring efforts should be directed towards those species that are most sensitive to land use changes and human disturbance. Those species that are probably most sensitive, based on relatively narrow food niche breadth and nesting habitat, include golden eagles, prairie falcons, and Cooper's hawks. Those species that select a wider variety of prey and nest sites (e.g., red-tailed hawks and great horned owls) are probably more adaptable to changes and less likely to suffer major impacts.

This 1 year inventory of breeding raptors along the Blackfoot River provides a baseline from which to monitor in the future. Consecutive-year sampling should reduce survey problems and the effects of annual fluctuations in nesting. To measure environmental changes, resource managers need not only baseline data on distribution and abundance (objectives of this study) but also on productivity of raptors. This will provide a basis for evaluating the future status of these species in southeastern Idaho.

Needed changes in survey methods were recognized. Owl surveys should be conducted in March and April. Access to the Blackfoot River is limited that time of year and a snowmobile or 4-wheeler would be necessary for travelling. Also, owl surveys should not be conducted past midnight.

An outline of recommendations for monitoring follows.

1. Four years of baseline data on productivity are probably needed to evaluate changes in productivity that might be due to land-use actions; most likely, 4 years of data would clarify changes in productivity due to rodent cycles.

2. This effort would require 2 people for 4-8 days a month in April, May, June, and July; cliffs and trees should be surveyed with equal time beginning in May.

3. Once baseline data collection on productivity is completed, then occupancy and breeding attempts could be checked for preselected sites, which would reduce the amount of work power needed to monitor in the future.

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